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EXAMINER	
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ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 12/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/064,727	FREEDMAN, ROBERT
	Examiner	Art Unit
	Tiffany A. Fetzner	2859

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-24 and 28-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-8,10-12,14 and 28-32* is/are rejected.

7)☒ Claim(s) *9, 13, and 15-24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 August 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/31/2005*.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *12/19/2005* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED Final ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 05/31/2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner has considered the information disclosure statement. The initialed and Dated IDS is attached to this office action.

2. The examiner notes that the **"...microwave dielectric constant** ..." article submitted with the IDS of 5/31/2005 **has not been considered** on the merits because the reference is incomplete. There is missing text from the top/bottom of some of the textual columns / tables. There are places of blurry and illegible text. The reference has been placed in the file but not treated on the merits, because the reference is incomplete.

Claim Objections

3. **Claims 6, 7, and 10** are objected to because of the following informalities:

A) With respect to **Amended Claim 10** applicant has a duplicate "the" after the initial "wherein" in the August 30th 2005 amendment of claim 10.

B) With respect to **Claims 6** and **7** these claims are objected to because they **depend from canceled claim 5**, a dependent claim cannot depend from a canceled claim. Appropriate correction is required.

Canceled Claims

4. **Claims 5, 25, 26**, and **27** are canceled as per applicant's August 22nd 2005 amendment and response.

Response To Arguments

5. Applicant's arguments filed 08/30/2005 have been fully considered but they are not persuasive. Applicant argues on page 10 of the August 30th 2005 response that the **Lew** et al., reference does not "teach or suggest the making or using dielectric measurements". [See page 10 paragraph 1 of the August 30th 2005 amendment / response.] However, applicant has failed to note that because **oil is a dielectric medium** that a measurement of the "oil", is itself "a dielectric measurement" and that

the use of the "oil measurements" constitutes a using of a measurement which represents a "dielectric medium".

6. Applicant next argues that "**Lew et al.,** fails to teach a "combining of the **density**, **dielectric constant**, **and NMR** **to compute more accurate fluid volumes**" [See page 10 paragraph 1 of the August 30th 2005 amendment / response.] However, the limitation argues and underlined above, is not recited in applicant's pending independent claim 1. Additionally "a dielectric measurement" which may be represented by the amount of oil, because 'oil is a dielectric medium" is not equivalent to a "dielectric constant" and is also not equivalent to 'the dielectric constant of oil'. These are three different measurements, with "dielectric measurement' being the broadest, and also the apparent source of the confusion over the relevance of the **Lew et al.,** reference. The rejections below are based upon what applicant actually, claims not what is argued in the August 30th 2005 response, but not recited in the claims.

7. Applicant fails to require in independent claim 1, that a "specific" dielectric measurement (i.e. the specific dielectric constant, as opposed to the 'relative dielectric constant' of **Lew et al**., as set forth in the August 30th 2005 arguments) is made by a separate non-NMR microwave, or high frequency dielectric tool, is performed. Applicant argues that '**Lew et al**., performs only NMR measurements, while applicant's method performs NMR measurements and separate Non-NMR "dielectric measurements", however, the argument is not persuasive, because there is nothing in the claim, which clarifies that the dielectric measurement is distinct from the NMR measurements, because it has been acquired from a non-NMR tool. The only thing recited in the actual claim is "acquiring a dielectric measurement of the earth formation", how / with what the dielectric measurement is made is left open, so that fact that **Lew et al**., only performs NMR measurements" is a non-persuasive argument since **Lew et al**., does determine a measurement of the dielectric "oil" medium itself. As to the arguments of page 10 paragraph 3 of the August 30th 2005 amendment and response, applicant's claim simply fails to recite "combining NMR measurements, with non-NMR dielectric / resistivity / density measurements".

8. The examiner spoke to applicant's representative, Bryan L. White Reg. No. 45,211 on November 23rd 2005 in an attempt to resolve this issue, but no resolution was reached.

9. The applicant's representative did confirm in the November 23rd 2005 telephonic interview, as a way of distinguishing between 'relative" (i.e. **Lew et al**") and "specific" (i.e. applicant's argued but not claimed limitation) concerning "dielectric measurements" in general that a **resistivity** measurement of the type disclosed in applicant's own earlier **Freedman et al.**, **US patent 6,032,101** issued Feb. 29th 2000; which is effectively a prior art reference under **35 USC 102 (b),** and was submitted for consideration by the examiner with the IDS of 5/31/2005, is a type of "specific" dielectric measurement within the scope of the instant application.

10. The examiner noted to applicant, in the November 23rd 2005 telephonic interview, that the term "**resistivity** is not found in the original disclosure of the instant application" and that the use of this term would constitute: "a new issue", grounds for a new search, a potential non-statutory double patenting problem, and potential "new matter', because **figure 4** of **Freedman et al.**, **US patent 6,032,101** shows **separate NMR measurements in step 405, separate resistivity measurements in step 409,** and **the combining of the separate NMR and resistivity measurements to determine Qv in step 417** that meets the features argued, in the August 30th 2005 amendment and response **which are not presently claimed** in the instant application.

11. With respect to **Claim 30**, applicant argues on page 11, of the August 30th 2005 response that the **Lew et al.**, reference fails to teach that "a combination of NMR measurements with bulk density measurements is desirable and useful" and again relies on the argument that the **Lew et al.**, reference teaches only NMR measurements. [See page 11 of the August 30th 2005 amendment and response.] The examiner notes that like the arguments above, applicant fails to require that the bulk density measurements be unrelated to the NMR measurements acquired. The examiner also notes that because the **Lew et al.**, reference teaches bulk-density measurements for determining gasses within a sample as known from the prior art, that this limitation in and of itself is not normal. Just because a reference teaches a feature in a known

context of the background teachings, does not preclude the teaching from meeting a recited limitation in a claim being examined on the merits, as the scope of the established conventional background is also an aspect of the scope of the applied prior art reference. Currently applicant's arguments for this claim are not persuasive because the novel combination of features argued is not clearly recited in the pending claim 30.

12. Additionally, with respect to **claim 30**, applicant would also need to clarify how any amendments to **claim 30** would be distinct from the bulk density measurements ρb of **figures 2, 3, and 4** of **Freedman et al.**, **US patent 6,032,101;** since amending claim 30 to resolve the current issues, and require a separate bulk density measurement, without a clear distinction would make the **Freedman et al.**, **US patent 6,032,101;** applicable to the potentially amended claims, and may raise the issue of Double patenting.

13. The rejections below are based on the pending claims of August 30th 2005, and what is actually recited in those claims, as opposed to the non-recited limitations noted above.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. **Claims 1-4, 8, 10, 11,12,** and **30** are **Finally** rejected under **35 U.S.C. 102(b)** as being anticipated by **Lew et al.**, US patent 4,785,245 issued November 15th 1988.

16. With respect to **Amended Claim 1**, **Lew et al.,** teaches " A method for making formation evaluation determinations, comprising: acquiring a nuclear magnetic resonance measurement of an earth formation" [See col. 15 lines 8-18; col. 15 line 68 through col. 16 line 29; and col. 3 line 44 through col. 4 line 8; where FID's and spin-echo NMR measurements along with spin-spin (i.e. t2) and spin-lattice (i.e. t1) NMR

signal times are acquired from the **Lew et al.,** device which is installed "in an oil well flow line" See also col. 3 lines 59-68 and the abstract.]

17. **Lew et al.,** also teaches that oil is a dielectric medium, [See col. 1 line 68 and the entire **Lew et al.,** reference which concerns determining / acquiring an accurate measurement for the total oil fraction in an oil well flow line, that comprises oil, water, gas and soil (i.e. earth formation) elements. See also the abstract, and col. 3 line 44 through col. 4 line 8. The examiner notes that **oil is a dielectric medium**, and the **Lew et al.,** reference teaches an apparatus / method that actually detects and measures only oil fraction in the mixture. [See col. Col. 16 lines 4-6; col. 15 lines 8-18] The examiner notes that because oil is a dielectric medium, that a measurement of the oil of the earth formation, represents a dielectric measurement of the earth formation, outside of / or in addition to, the other NMR measurements of the **Lew et al.,** reference.]

18. **Lew et al.,** also teaches "acquiring a dielectric measurement of the earth formation;" because the **Lew et al.,** reference measures the amplitude of the RF signal from the dielectric medium of oil directly, since almost none (i.e. no significant amount of NMR rf emission from water is detected) of the aqueous component contributes to the detected signal, the amplitude measurement(s) of the oil emission is / are a "dielectric measurement"(s). [See col. 15 line 62 through col. 16 line 29; col. 13 lines 41-50; col. 1 lines 67-68; col. 4 line 50 through col. 5 line 2] The examiner also notes that applicant's claim, contrary to applicant's arguments in the August 22nd 2005 response, fails to recite that the dielectric measurement must be a dielectric measurement acquired without any part of the dielectric measurement being obtained from the acquisition of the NMR signal components. Therefore, the direct oil measurement of **Lew et al.,** even though it results from NMR signals meets the requirements of applicant's recited limitation.

19. **Lew et al.,** also teaches "determining an oil volume fraction of the earth formation from a combination of the nuclear magnetic resonance measurement" (i.e. the NMR signals) "and the dielectric measurement." (i.e. preferably the initial amplitude of the RF emission, which is the direct oil measurement. [See col. 3 line 44 through col. 16 line 29; abstract, as this limitation is a main principle of the entire **Lew et al.,** reference.] [See also the response to arguments above.]

20. With respect to **Claim 2**, **Lew et al.,** teaches "the nuclear magnetic resonance measurement comprises at least one spin echo amplitude." [See col. 16 lines 22-29] The same reasons for rejection, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

21. With respect to **Claim 3**, **Lew et al.,** teaches that "the acquiring the nuclear magnetic resonance measurement uses" an initial "polarization time sufficiently long so that nuclear spins are substantially polarized", because **Lew et al.,** teaches exposing a material to a strong constant magnetic field so that statistically many of (ie substantially all of) the nuclei magnetic moments become oriented parallel to the z-axis, (i.e. become substantially polarized). The examiner notes that using a strong magnetic field, to expose a material so that many, or all of the nuclei magnetic moments, become oriented parallel to the z-axis, is a teaching of "a polarization time sufficiently long so that nuclear spins are substantially polarized". [See col. 8 lines 3-15; col. 9 line 66 through col. 10 line 17; col. 11 lines 45-61.] The same reasons for rejection, which apply to **claims 1, 2** also apply to **claim 2** and need not be reiterated.

22. With respect to **Claim 4**, **Lew et al.,** teaches/shows that "the dielectric" (i.e. the oil) "measurement comprises an electromagnetic wave phase shift" because the excitation flipping / tipping / rotating / nutating of the magnetization from the z-axis to the x, y plane, for conducting the oil measurement, is a change in the phase of the magnetization. The phases of various nuclei are shown in Figures 5a through 5g. The phase shifts are viewable by taking figures 5a through 5g in combination. The FID(s) or the spin-echo signal(s) which is / are detected by **Lew et al.,** is / are a result of the "electromagnetic wave phase shift" caused by the excitation pulse, as the excited nuclei realign with the z-axis. [See figures 5a through 5g; col. 5 lines 59-64] The same reasons for rejection, that apply to **claim 1,** also apply to **claim 4** and need not be reiterated.

23. With respect to **Amended Claim 10**, **Lew et al.,** teaches that "[~~the~~] the formation evaluation determinations are based on formation fluids ~~comprise~~ comprising at least one sample withdrawn from a formation traversed by a borehole", [See col. 6 line 4 through col. 7 line 25; col. 3 lines 60-68] **Lew et al.,** also teaches that "a sum of an oil volume fraction and a water volume fraction is taken to be one" because **Lew et al.,**

teaches that by subtracting the fraction of water cut from the total volume fraction to determine the oil cut fraction, the prior art commits the basic fallacy of assuming that whatever is not water in the mixture is oil. [See col. 1 line 51 through col. 2 line 9] This teaching that the prior art assumes "whatever is not water is oil" is an equivalent way of stating that "a sum of an oil volume fraction and a water volume fraction is taken to be one". [See col. 1 line 51 through col. 2 line 9] The same reasons for rejection, that apply to **claim 1,** also apply to **claim 10** and need not be reiterated.

24. With respect to **Claim 11**, **Lew et al.,** teaches "determining a total volume of the formation fluids from the nuclear magnetic resonance measurement; determining the water volume fraction of the formation fluids from the dielectric measurement; and determining the oil volume fraction of the formation fluids by subtracting the water volume fraction of the formation fluids from the total volume of the formation fluids." [See col. 1 line 51 through col. 3 line 24] The same reasons for rejection, that apply to **claims 1, 10,** also apply to **claim 11** and need not be reiterated.

25. With respect to **Claim 8**, and corresponding **claim 12** which depend respectively from **claims 1,** and **10**, **Lew et al.,** teaches and shows that "the dielectric measurement comprises an electromagnetic wave attenuation", [See col. 2 line 40 through col. 3 line 10; col. 13 line 40 through col. 16 line 38; figures 4a through 6] Additionally, because the initial amplitude measurements are taken, by **Lew et al.,** compared to a 100% flowing sample of oil obtained under the same conditions, result in a deviation, the actual **Lew et al.,** dielectric measurement(s) is / are electromagnetic wave attenuated. The deviation is itself a representation of the "attenuation". [See also col. 14 line 48 through col. 15 line 18, abstract, col. 4 line 50 through col. 5 line 2 and col. 2 line 50 through col. 3 line 10]. The same reasons for rejection, that apply to **claims 1, 5, 10** also apply to **claims 8, 12** and need not be reiterated.

26. With respect to **Amended Claim 30**, **Lew et al.,** teaches "A method for determining a gas fractional volume in a gas-liquid sample", [See col. 1 lines 51-61; col. 3 line 44 through col. 5 line 39; col. 14 line 57 through col. 16 line 29] "comprising: acquiring a bulk density measurement of the gas-liquid sample;" [See col. 2 lines 27-39] "acquiring a nuclear magnetic resonance measurement of the gas-liquid sample;" [See

col. 2 line 40 through col. 3 line 10] "and determining the gas fractional volume of the gas-liquid sample from a combination of the bulk density measurement and the nuclear magnetic resonance measurement" [See col. 2 line 27 through col. 3 line 10].

35 USC 103 Rejections

Claim Rejections - 35 USC § 103

27. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

28. **Claims 1-3, 7, 10, 11, 14, 30,** and **31** are **Finally** rejected under **35 U.S.C. 103(a)** as being unpatentable over **Freedman et al.**, US patent 6,032,101 issued February 29th 2000; and in view of the November 23rd 2005 telephonic interview with applicant's representative in which the fact that a resistivity measurement **is a type of dielectric measurement** was unequivocally established, because applicant relied on this point as a means justifying applicant's position that the **Lew et al.**, reference which only performs NMR measurements, should be removed from consideration as prior art. The examiner was not persuaded by the argument, since oil is a dielectric medium itself, and claim 1 does not require a non-NMR dielectric measurement, but the issue of **Freedman et al.**, meeting the claims of the invention was raised.

29. With respect to **Amended Claim 1**, **Freedman et al.**, teaches and shows "A method for making formation evaluation determinations, comprising: acquiring a nuclear magnetic resonance measurement of an earth formation" [See figures 1-4; abstract, col. 1 line 6 through col. 21 line 8, where FID's and spin-echo CPMG NMR measurements along with spin-spin (i.e. t2) and spin-lattice (i.e. t1) NMR signal times are acquired from the **Freedman et al.**, device which is installed "in a subsurface" (i.e. earth) formation".

30. **Freedman et al.**, also teaches and shows the step of "acquiring a dielectric measurement of the earth formation; even though the term "dielectric" is lacked

because the electrical resistivity measurements of **Freedman et al.**, are a conventionally well-known type of "dielectric measurement", as evidenced by applicant's arguments to the examiner in the November 23rd 2005 telephonic interview. [See col. 1 line 6 through col. 21 line 8; and figure 4 step 409 as one example.] It would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Freedman et al.**, to include the term "dielectric" in combination with the resistivity teachings because resistivity measurements are dielectric measurements.

31. **Freedman et al.**, also teaches and shows "determining an oil volume fraction of the earth formation from a combination of" [See figure 4 steps 415 through 440] "the nuclear magnetic resonance measurement" (i.e. the NMR signals of step 405 in figure 4) "and the dielectric measurement." (i.e. the resistivity measurements of step 409 in figure 4) [See figures 1-4; the abstract, and col. 1 line 6 through col. 21 line 8 as this limitation is a main principle of the entire **Freedman et al.**, reference.]

32. With respect to **Claim 2**, **Freedman et al.**, teaches, that "the nuclear magnetic resonance measurement comprises at least one spin echo amplitude." [See col. 2 lines 20-50; col. 3 lines 4-5; where CPMG NMR sequences are comprised of a series of spin echo amplitude pulses.] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

33. With respect to **Claim 3**, **Freedman et al.**, teaches that "the acquiring the nuclear magnetic resonance measurement uses" an initial "polarization time sufficiently long so that nuclear spins are substantially polarized", [See col. 20 line 36 through col. 21 line 4; and col. 8 line 66 through col. 10 line 54 where ρg is the polarization time parameter.] The same reasons for rejection, obviousness, and motivation to combine, which apply to **claims 1, 2** also apply to **claim 2** and need not be reiterated.

34. With respect to **Claim 7**, [which is considered by the examiner to depend from claim 1, since it cannot depend from **canceled claim 5**] **Freedman et al.**, teaches and shows the term "porosity" throughout the reference and **Freedman et al.**, also teaches and shows "determining a water-filled porosity from the dielectric measurement; determining a total formation porosity from the nuclear magnetic resonance

measurement; and determining an oil-filled porosity by subtracting the water-filled porosity from the total formation porosity". [See col. 1 line 14 through col. 21 line 8; figures 1 through 4, and specifically all the different numerical calculations, of each of the different parameters and components set forth in the reference; equations 1-62; and tables 1-5] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1,** also apply to **claim 7,** and need not be reiterated.

35. With respect to **Amended Claim 10**, **Freedman et al.**, teaches that "[~~the~~] the formation evaluation determinations are based on formation fluids ~~comprise~~ comprising at least one sample withdrawn from a formation traversed by a borehole", See figures 1-4; abstract, col. 1 line 6 through col. 21 line 8] **Freedman et al.**, also teaches that "a sum of an oil volume fraction and a water volume fraction is taken to be one" based on equation 39 and the general assumption of two principle constituents, which could be limestone/sandstone, or oil/water etc... as long as there are two principle components. [See col. 14 line 61 through col. 21 line 8] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1,** also apply to **claim 10** and need not be reiterated.

36. With respect to **Claim 11**, **Freedman et al.**, teaches and shows "determining a total volume of the formation fluids from the nuclear magnetic resonance measurement; determining the water volume fraction of the formation fluids from the dielectric measurement; and determining the oil volume fraction of the formation fluids by subtracting the water volume fraction of the formation fluids from the total volume of the formation fluids." [See col. 1 line 6 through col. 21 line 8, figures 2, 3, 4 and the abstract, mainly figure 4.] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 10,** also apply to **claim 11** and need not be reiterated.

37. With respect to **Amended Claim 14**, **Freedman et al.**, teaches "A method for making formation evaluation determinations ~~evaluating a volume of formation fluids~~, comprising: acquiring a nuclear magnetic resonance measurement of an earth formation;" [See figures 1-4; abstract, col. 1 line 6 through col. 21 line 8, where FID's and spin-echo CPMG NMR measurements along with spin-spin (i.e. t2) and spin-lattice (i.e. t1) NMR signal times are acquired from the **Freedman et al.**, device which is

installed "in a subsurface" (i.e. earth) formation". **Freedman et al.**, also teaches "acquiring a dielectric measurement of the earth formation;" because the electrical resistivity measurements of **Freedman et al.**, are a conventionally well-known type of "dielectric measurement", as evidenced by applicant's arguments to the examiner in the November 23rd 2005 telephonic interview. [See col. 1 line 6 through col. 21 line 8; and figure 4 step 409 as one example.]

38. Additionally, **Freedman et al.**, also teaches "acquiring a bulk density measurement of the earth formation;" [See col. 9 line 26-34; col. 16 lines 7-46] ~~and~~ "forming a set of linear response equations representing a reservoir fluid model; and solving a the set of linear response equations ~~representing a reservoir fluid model~~ to determine fractional fluid volumes of the earth formation" [See col. 1 line 6 through col. 21 line 8; figures 1-4, equations 1-62, and tables 1-5 where determining the fractional amount of each component by separating the components, measuring each component and subtracting each non-oil amount from the total volume amount is the step of "forming a set of linear response equations representing a reservoir fluid model; and solving the set of linear response equations to determine fractional fluid volumes of the earth formation from a combination of the nuclear magnetic resonance measurement", (i.e. the NMR signals) "and the dielectric measurement." (i.e. the initial resistivity measurements) is taught and shown by figure 4.] "and the bulk density measurement." [See col. 1 line 6 through col. 21 line 8; figures 1-4, equations 1-62, and tables 1-5] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1** also apply to **claim 14** and need not be reiterated.

39. With respect to **Amended Claim 30**, **Freedman et al.**, teaches and shows "A method for determining a gas fractional volume in a gas-liquid sample", [See figures 1-4, col. 1 line 6 through col. 21 line 8.] "comprising: acquiring a bulk density measurement of the gas-liquid sample;" [See col. 8 lines 66 through col. 21 line 8] "acquiring a nuclear magnetic resonance measurement of the gas-liquid sample;" [See figures 1-4, col. 1 line 6 through col. 21 line 8] "and determining the gas fractional volume of the gas-liquid sample from a combination of the bulk density measurement and the nuclear magnetic resonance measurement" [See figures 1-4, col. 1 line 6

through col. 21 line 8]. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1,** also apply to **claim 30** and need not be reiterated.

40. With respect to **Claim 31**, **Freedman et al.**, teaches "computing a density from the bulk density measurement and a fluid density and wherein the determining the gas fractional volume is performed using the density porosity and the nuclear magnetic resonance measurement" [See abstract, col. 1 line 6 through col. 21 line 8; equations 1-62; figures 1-4; and tables 1-5] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 30,** also apply to **claim 31** and need not be reiterated.

41. **Claims 6-7, 14, 31,** and **32** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Lew et al.**, US patent 4,785,245 issued November 15th 1988.

42. With respect to **Claim 6**, **Lew et al.,** lacks directly stating, but does suggest that the steps of "acquiring the nuclear magnetic resonance measurement and the acquiring the dielectric measurement are performed while drilling", because **Lew et al.,** teaches continuously or instantaneously detecting and measuring on a real-time basis the oil-cut and net amount of in a mixture of materials installed in an oil well flow line, gathering network line, or other flow pipe. [See col. 3 lines 44-68] These teachings suggest that the **Lew et al.,** device is installable in any oil well device, especially the logging-while-drilling tools which are conventionally used to measure and drill formation fluids on a real-time basis. The same reasons for rejection, that apply to **claims 1, 5,** also apply to **claim 6** and need not be reiterated.

43. With respect to **Claim 7**, **Lew et al.,** lacks directly teaching the term "porosity" therefore **Lew et al.,** also lacks directly teaching the exact terminology of "determining a water-filled porosity from the dielectric measurement; determining a total formation porosity from the nuclear magnetic resonance measurement; and determining an oil-filled porosity by subtracting the water-filled porosity from the total formation porosity". However, the examiner notes that **Lew et al.,** does teach and suggest these determinations in the description of the prior art techniques without explicitly using the term "porosity". [See col. 1 line 28 through col. 3 line 34 where the water measurements conducted with NMR techniques, to determine a total volume of the formation, and a

bulk density of the total mixture suggest a "total formation porosity from the nuclear magnetic resonance measurement"; because by established conventional definition "porosity" is 'the ratio of the volume of interstices to the volume of its mass' and the fact that "density" measurements are conducted in addition to volume measurements implies the performing of a "total porosity measurement" and consequently the feature of "determining a total formation porosity from the nuclear magnetic resonance measurement".] The water-filled or water cut measurements in combination with the teachings of col. 1 line 28 through col. 3 line 34 also suggest a "water-filled porosity from the dielectric measurement;" **Lew et al.,** also teaches subtracting the water cut from the total to determine the oil cut. [See col. 2 lines 2-3] Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made that even though the term "porosity" itself is lacked by the reference the **Lew et al.,** reference also teaches and suggests "determining an oil-filled porosity by subtracting the water-filled porosity from the total formation porosity". The same reasons for rejection, that apply to **claims 1, 5,** also apply to **claim 7,** and need not be reiterated.

44. With respect to **Amended Claim 14**, **Lew et al.,** teaches "A method for making formation evaluation determinations ~~evaluating a volume of formation fluids~~, comprising: acquiring a nuclear magnetic resonance measurement of an earth formation;" [See col. 15 lines 8-18; col. 15 line 68 through col. 16 line 29; and col. 3 line 44 through col. 4 line 8; where FID's and spin-echo NMR measurements along with spin-spin (i.e. t2) and spin-lattice (i.e. t1) NMR signal times are acquired from the **Lew et al.,** device which is installed "in an oil well flow line" See also col. 3 lines 59-68 and the abstract.] **Lew et al.,** also teaches that oil is a dielectric medium, [See col. 1 line 68 and the entire **Lew et al.,** reference which concerns determining / acquiring an accurate measurement for the total oil fraction in an oil well flow line, that comprises oil, water, gas and soil (i.e. earth formation) elements. [See abstract, and col. 3 line 44 through col. 4 line 8] The examiner notes that oil is a dielectric medium, and the **Lew et al.,** reference teaches an apparatus / method that actually detects and measures only oil fraction in the mixture. [See col. Col. 16 lines 4-6; col. 15 lines 8-18] **Lew et al.,** also teaches "acquiring a dielectric measurement of the earth formation;" because the **Lew et al.,** reference

measures the amplitude of the RF signal from the dielectric medium of oil directly, since almost none (i.e. no significant amount of NMR rf emission from water is detected) of the aqueous component contributes to the detected signal, the amplitude measurement(s) of the oil emission is / are a "dielectric measurement"(s). [See col. 15 line 62 through col. 16 line 29; col. 13 lines 41-50; col. 1 lines 67-68; col. 4 line 50 through col. 5 line 2]

45. Additionally, **Lew et al.,** also teaches "acquiring a bulk density measurement of the earth formation;" [See col. 2 line 27 through col. 3 line 10] ~~and~~ "forming a set of linear response equations representing a reservoir fluid model; and solving a the set of linear response equations ~~representing a reservoir fluid model~~ to determine fractional fluid volumes of the earth formation" [See col. 1 lines 51 through col. 2 line 9 where determining the fractional amount of each component by separating the components, measuring each component and subtracting each non-oil amount from the total volume amount is the step of "forming a set of linear response equations representing a reservoir fluid model; and solving the set of linear response equations to determine fractional fluid volumes of the earth formation". **Lew et al.,** also teaches performing this step "from a combination of the nuclear magnetic resonance measurement", (i.e. the NMR signals) "and the dielectric measurement." (i.e. preferably the initial amplitudes of the RF emissions). [See col. 3 line 44 through col. 16 line 29; in combination with the abstract], "and the bulk density measurement." [See col. 2 line 27 through col. 3 line 10]

46. With respect to **Claim 31**, **Lew et al.,** teaches "computing a density from the bulk density measurement and a fluid density", [See col. 2 line 27 through col. 3 line 10] and wherein the determining the gas fractional volume is performed using the density and the nuclear magnetic resonance measurement" [See col. 2 line 27 through col. 3 line 10; col. 1 lines 51-61; col. 3 line 44 through col. 5 line 39; col. 14 line 57 through col. 16 line 29]. **Lew et al.,** lacks directly teaching the term "porosity" therefore as in the rejection of **claim 7**, **Lew et al.,** lacks directly teaching "computing a density porosity from the bulk density measurement and a fluid density and wherein the determining the gas fractional volume is performed using the density porosity and the nuclear magnetic resonance measurement", by exact terminology however, a gas density porosity is

suggested by **Lew et al.,** because the **Lew et al.,** reference determines both volume and mass for the components present in a multi-component fluid regardless of whether the sample is liquid/gas liquid/liquid liquid/solid, gas/liquid/solid, gas/liquid/liquid etc., therefore It would have been obvious to one of ordinary skill in the art at the time that the invention was made that "porosity" measurement for gas components are also a part of the **Lew et al.,** reference.

47. With respect to **Amended Claim 32**, **Lew et al.,** teaches "A method for making formation evaluation determinations" (i.e. traversed by a well or pipeline) [See col. 1 line 6 through col. 16 line 29, abstract], "comprising: acquiring a dielectric measurement of an earth formation;" [See col.. 1 line 68, and col. 3 line 44 through col. 16 line 29, as determining a true measurement of the dielectric oil is a main goal of the **Lew et al.,** reference. **Lew et al.,** also teaches "determining a dielectric-derived water volume of the earth formation from the dielectric measurement"; [See also col. 13 lines 41-50 where any component fraction or component cut (i.e. water, oil or gas) respectively is determined by 'comparing the maximum amplitude of the NMR emission from a volume of the mixture when the maximum amplitude of the NMR emission from an equal volume of 100% of the material exposed to the same NMR conditions'.] "the dielectric acquiring a suite of nuclear magnetic resonance measurements of the earth formation;" [See figure 6, col. 3 line 44 through col. 16 line 29,] "deriving a water volume of the earth formation and an apparent heavy oil volume of the earth formation from the nuclear magnetic resonance measurements;" [See the **Lew et al.,** teachings of what is already known from the prior art of col. 1 line 27 through col. 3 line 24] "and comparing the dielectric-derived water volume" (i.e. the water-cut volume obtained by the **Lew et al.,** method) "with the nuclear magnetic resonance derived water volume" (i.e. the NMR water volume determination known from the **Lew et al.,** teachings of what is already known from the prior art) "and the apparent oil volume" (i.e. the NMR oil volume determination known from the **Lew et al.,** teachings of what is already known from the prior art is an apparent oil volume) "to produce a true heavy oil volume" (ie the volume oil cut which is the result of the **Lew et al.,** device when the material desired to be

detected is oil) "of the earth formation". [See the teachings of the entire **Lew et al.,** reference taken in combination with one another, with all figures and the abstract.]

48. **Lew et al.,** lacks directly teaching the exact terminology of an "apparent oil volume". However, it would have been obvious to one of ordinary skill in the art at the time that the invention was made that in the description of the known prior art techniques that the basic fallacy assumption of the prior art that "whatever is not water in the mixture is oil" results in the prior art technique's oil cut as being an "apparent oil volume" cut.

49. **Claims 28** and **29** are rejected under **35 U.S.C. 103(a)** as being unpatentable over by **Schoen et al.**, US patent 6,686,736 B2 issued February 3rd 2004, filed August 13th 2001 with an effective US provisional priority date of August 30th 2000.

50. With respect to **Amended Claim 28**, **Schoen et al.**, teaches and claims "A method for making formation evaluation determinations ~~evaluating a formation traversed by a borehole~~, comprising: acquiring a nuclear magnetic resonance measurement of an earth formation; [See col. 16 lines 22-64; and col. 1 line 15 through col. 16 line 20 in general] "acquiring a dielectric measurement of the earth formation;" [See col. 16 lines 22-64; and col. 1 line 15 through col. 16 line 20 in general. The examiner notes that the resistivity and conductivity measurements are types of dielectric measurements related to the porosity and permittivity of an earth formation by the relationships taught in the **Schoen et al.**, reference. See col. 1 line 26 through col. 16 line 20] "and determining a rock-matrix travel time associated with the earth formation" [See col. 6 line 33 through col. 7 line 29 where resistivities both horizontally and vertically over the depth and thickness of the formation for each layer (i.e. the rock matrix) for multiple frequencies and wavelengths are acquired from "a combination of the nuclear magnetic resonance measurement and the dielectric measurement" [See col. 16 lines 29-33, and figures 4a and 4B].

51. The **Schoen et al.**, reference lacks directly teaching the term "rock matrix" however It would have been obvious to one of ordinary skill in the art at the time that the invention was made that the measurements made at each layer of the earth formation are a "rock matrix".

52. With respect to **Amended Claim 29**, **Schoen et al.**, teaches "determining a rock-matrix travel time log as a function of **a** 'borehole' depth" because the thickness of the formation comprised of one or more layers corresponds to the depth of the formation. The same reasons for rejection, and obviousness, that apply to **claim 28** also apply to **claim 29** and need not be reiterated.

Allowable Subject Matter

53. **Claims 9**, **13**, and **15-24** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

54. With respect to **Claim 13**, the prior art of record fails to teach the combinational limitation of "calculating a **salinity of a brine** in the sample based on a total volume of the formation fluids and a known aqueous phase attenuation function ***with respect to the salinity and a fluid temperature***".

55. With respect to **Claim 9**, the prior art of record fails to teach and suggest all the features of **claim 9**, because **claim 9** also requires **the salinity calculation specified by** objected to **claim 13**.

56. With respect to **Claim 15**, the prior art of record fails to teach and suggest the entire combination that "the reservoir fluid model comprises a representation of a non-gas bearing formation, the fractional fluid volumes comprise a water volume fraction, an oil volume fraction, and an oil-based mud filtrate volume fraction, and the set of linear response equations comprises: a nuclear magnetic resonance response equation that defines a total volume of the formation fluids with respect to the oil volume fraction, the water volume fraction, and the oil-based mud filtrate volume fraction; *a dielectric response equation that defines an electromagnetic wave travel time with respect to the oil volume fraction and oil travel time, the water volume fraction and a water travel time, and the oil-based mud filtrate volume fraction and an oil-based mud filtrate travel time*; and a density response equation that defines the bulk density with respect to an oil density and the oil volume fraction, a water density and the water volume fraction, and an oil-based mud filtrate density and the oil-based mud filtrate volume fraction.

57. **Claims 16-21** are objected to because they depend from objected to **claim 15**.

58. With respect to **Amended Claim 22**, the prior art of record fails to teach and suggest the entire combination that "the reservoir fluid model comprises a representation of a gas-bearing formation, the fractional fluid volumes comprise a gas volume fraction, a water volume fraction, and a gas-corrected total volume, and the set of linear response equations comprises: a[~~n~~] nuclear magnetic resonance response equation that defines **[~~the~~]** **a** total volume of **[~~the~~]** formation fluids with respect to the gas volume fraction, a water volume fraction, and a gas-corrected total volume; *a dielectric response equation that is adapted for the gas-bearing formation by defining an electromagnetic wave travel time with respect to the gas volume fraction and a gas travel time, the water volume fraction and a water travel time, and the gas-corrected total volume and a gas-corrected travel time; and a density response equation that is adapted for the gas-bearing formation by defining the bulk density measurement with respect to the gas volume fraction and a gas density, the water volume fraction and a water density, and the gas-corrected total volume and a gas-corrected total density.*

59. **Claims 23-24** are objected to because they depend from objected to **claim 22**.

60. **Applicant's submission of an information disclosure statement under 37 CFR 1.97(c)** with the fee set forth in 37 CFR 1.17(p) on 05/31/2005 **prompted the new ground(s) of rejection** presented in this Office action by **Freedman et al., US patent 6,032,101**. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609.04(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

61. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Prior Art of Record

62. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A) Georgi et al., US patent application Publication 2004/0055475 A1 published March 25th 2004, filed April 1st 2003; with a US priority date from provisional application 60/369,268 of April 2nd 2002.

Conclusion

63. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

64. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(571) 273-8300**.

TAF
December 18, 2005

Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800